Quarterly Test #1

$\frac{42}{42}$

100%

1. multiply the negative of the ΔH equation by 3

2. $\left(\frac{10 \text{ moles } \cancel{XA_2}}{1}\right)\left(\frac{2 \text{ moles } BA}{1 \text{ moles } \cancel{XA_2}}\right) = 20 \text{ moles } BA$

3. $\left(\frac{25.0 \text{ g } Mg}{1}\right)\left(\frac{1 \text{ mole } Mg}{24.3 \text{ g } Mg}\right) = 1.03 \text{ moles } Mg$

$\left(\frac{25.0 \text{ g } \cancel{HNO_3}}{1}\right)\left(\frac{1 \text{ mole } HNO_3}{63.0 \text{ g } \cancel{HNO_3}}\right) = 0.397 \text{ moles } HNO_3$

$\left(\frac{0.397 \text{ moles } HNO_3}{1}\right)\left(\frac{1 \text{ mole } Mg(NO_3)_2}{2 \text{ moles } HNO_3}\right) = 0.199 \text{ moles } Mg(NO_3)_2$

$\left(\frac{0.199 \text{ mole } Mg(NO_3)_2}{1}\right)\left(\frac{148.3 \text{ g } Mg(NO_3)_2}{1 \text{ mole } Mg(NO_3)_2}\right) = \boxed{29.5 \text{ g } Mg(NO_3)_2}$

4. $\frac{15.1 \text{ g}}{29.5 \text{ g}}(100) = 51.2\%$

5. $Zn(s) + S(s) \rightarrow ZnS(s)$

$+\ ZnS(s) + 2O_2(g) \rightarrow ZnSO_4(s)$

$Zn(s) + S(s) + \cancel{ZnS(s)} + 2O_2(g) \rightarrow \cancel{ZnS(s)} + ZnSO_4(s)$

$Zn(s) + S(s) + 2O_2(g) \rightarrow ZnSO_4(s)$

6. $Mn(s) + O_2(s) \rightarrow MnO_2(s)$

$Mn(s) + \frac{1}{2}O_2(g) \rightarrow MnO(s) \quad \Delta H = -385.1\,kJ$ ✓

$MnO(s) + \frac{1}{2}O_2(g) \rightarrow MnO_2(s) \quad \Delta H = -134.9\,kJ$ ✓

$\Delta H = -385.1\,kJ - 134.9\,kJ = \boxed{-520.0\,kJ}$ ✓

7. There will be 6 possible wavelengths ✓

8. it is atomic emisson spectroscopy ✓

9. Election A is in the s orbital ✓

10. $\Delta E = (2.18 \times 10^{-18} J) \cdot Z^2 \left(\left(\frac{1}{n_i}\right)^2 - \left(\frac{1}{n_f}\right)^2\right)$

$\Delta E = (2.18 \times 10^{-18} J) \cdot 1^2 \left(\left(\frac{1}{1}\right)^2 - \left(\frac{1}{3}\right)^2\right) = \boxed{1.94 \times 10^{-18} J}$ ✓

11. $\Delta E = (2.18 \times 10^{-18} J)\, Z^2 \left(\left(\frac{1}{n_i}\right)^2 - \left(\frac{1}{n_f}\right)^2\right)$

$\Delta E = (2.18 \cdot 10^{-18} J) 2^2 \left(\left(\frac{1}{3}\right)^2 - \left(\frac{1}{2}\right)^2\right) = -1.21 \times 10^{-18} J$ ✓

$E = h \cdot f$

$\frac{1.21 \times 10^{-18} J}{6.63 \times 10^{-34} J \cdot sec} = \frac{(\cancel{6.63 \times 10^{-34} J \cdot sec})(f)}{\cancel{6.63 \times 10^{-34} J \cdot sec}}$

$f = 1.83 \times 10^{15}\,Hz$ ✓

$f = \frac{v}{\lambda}$

$1.83 \times 10^{15} \frac{1}{\cancel{sec}} = \frac{300 \times 10^{8} \frac{m}{\cancel{sec}}}{\lambda}$

$\lambda = 1.64 \times 10^{-7}\,m$ ✓

12. The Quantum numbers are

$n=2, l=0, ml=0, ms=\frac{1}{2}$

$n=2, l=0, ml=0, ms=-\frac{1}{2}$

$n=2, l=1, ml=1, ms=\frac{1}{2}$

$n=2, l=1, ml=0, ms=\frac{1}{2}$

$n=2, l=1, ml=-1, ms=\frac{1}{2}$

$n=2, l=1, ml=1, ms=-\frac{1}{2}$

13. a. l cannot be 1 as it has to be less than the n value

b. ml can only be -2, -1, 0, 1, 2, Not 3

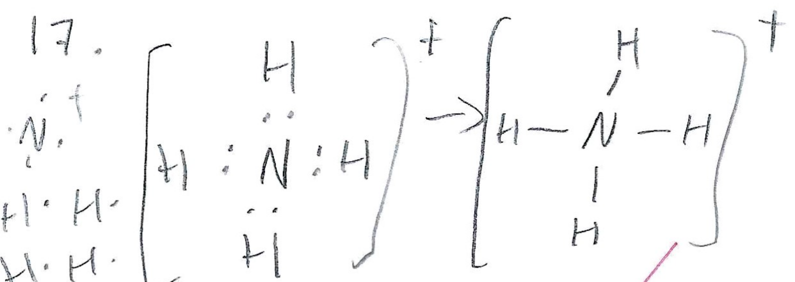
c. The Principle Quantum number cannot be zero

14. There are five hybrid orbitals

15. it is a π bond

16. $H-C\equiv \ddot{N}$ There are 2 π bonds and 2 σ bonds

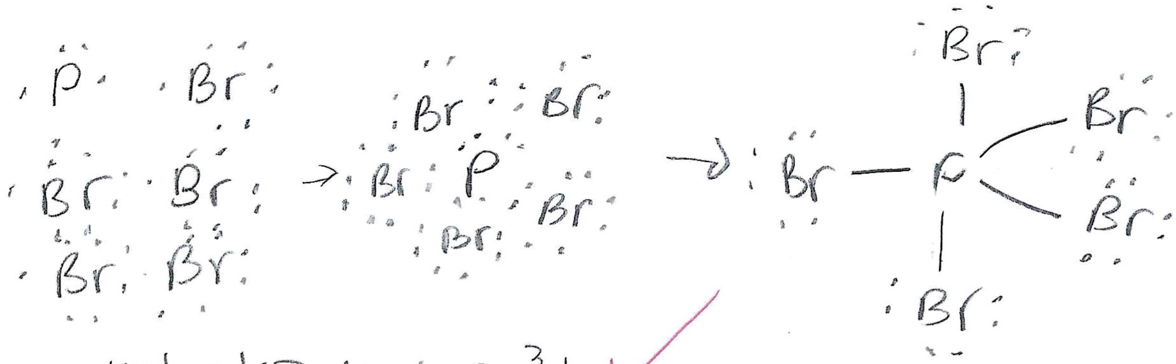
17.



hybridization: sp3

Geometry: tetrahedral

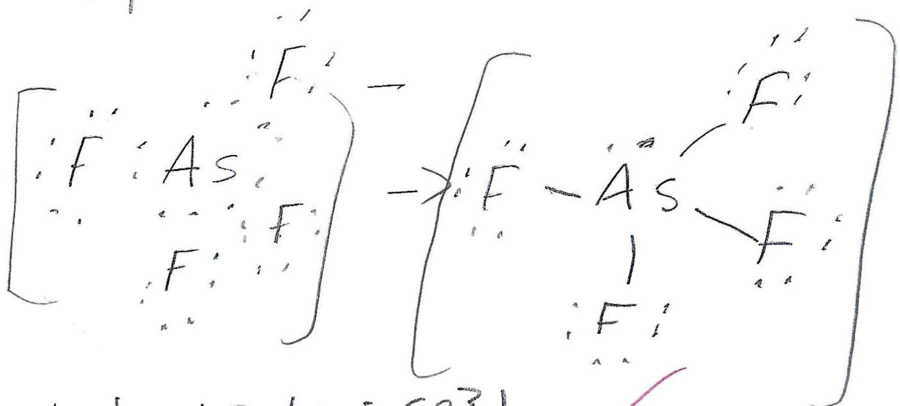
18.



hybridization: sp^3d

Geometry: trigonal bipyramidal

19. AsF_4^-



hybridization: sp^3d

Geometry: see-saw

20. The weakest van der Waals force is London dispersion force

21. The liquid will boil above its natural boiling point

22. Molecule a. will have the lowest boiling point

23. a. T_1 is the lowest temperature

b. T_2 will cool the quickest

24. The compound is in the liquid phase

25. The freezing point at 4atm is 25°C